COE & VAN LOO
CONSULTANTS, INC.

CITY OF GOODYEAR - REPORT APPROVAL	
Darren Farar, PE	Date 1/15/2013
HTE# 12-1465	QS# 53 - 93

WEST GOODYEAR CENTRAL PLANNING AREA MASTER RECLAIMED WATER STUDY UPDATE

September 19, 2012

Prepared for:

West Goodyear Owners Group

- Keith-Palm Canyon, L.L.C. (aka Las Palmas)
- Pacific Capital Meadows, L.L.C. (aka Amber Meadows)
- Citrus & Lower Buckeye, L.L.C. (aka LaJolla Vista)
- Pradera Partners 160, L.L.C. (aka Pradera)
- SUNBELT Holdings, Inc. (aka La Privada)
- Taylor Morrison, Inc. (aka Las Brisas Phase 2c)

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1.0 INTRODUCTION

1.1 General Description

In 2005 an association of 16 West Goodyear property owners formed a group known as the Initial Development Group (IDG) to develop a plan to solve water and sewer service issues in the area of the City of Goodyear (COG) known as the West Goodyear Central Planning Area (WGCPA), which may be described as the area of the COG bordered by I-10 on the north, Perryville Road on the west, MC 85 on the south, and Cotton Lane on the east. To that end, the IDG negotiated a Memorandum of Understanding (MOU) with COG that stipulated among other things that a master water and wastewater studies be performed to quantify the WGCPA's necessary infrastructure improvements and service capacity needs to satisfactorily provide water and sewer service to the WGCPA. The IDG retained Coe & Van Loo Consultants, Inc. (CVL) to prepare the required master water and wastewater study documents. The WGCPA Water and WGCPA Wastewater master studies were completed and approved by COG in July 2006.

The MOU also stipulated that each of the participating property owners within the IDG enter into a Development Agreement (Agreement) with the COG. Each Agreement had a 5-year "Sunset" term at the end of which all provisions would expire unless plats were recorded and all agreed upon development fees paid to COG. With only 2 of the 16 IDG Properties having proceeded, under the terms of their Agreement, letters from the COG began being received by the various members of the IDG on October 15, 2010, stating that COG planned to allow the Development Agreements to lapse. Five (5) of the remaining 14 IDG properties responded to the COG with applications for an amendment to their Development Agreements that would extend the Sunset provision of the Agreement by two (2) years allowing time to renegotiate the terms of the Agreement and then have a new Agreement for these five (5) remaining IDG properties heard and ruled on by COG City Council.

In December of 2011, the COG City Council approved Amendments for the five (5) responding IDG Members, which clarified the COG's position and indicated that the granting of a two-year extension would require that certain obligations be fulfilled by the five responding IDG Members including the preparation of new updated WGCPA Water and Wastewater Master Studies, which would reflect the findings of the COG's Integrated Water Master Plan (IWMP) and the recalculation of WGCPA's necessary Water and Wastewater infrastructure improvements and service capacity needs as well as cost allocation tables for the planned infrastructure improvements. The following report fulfills this requirement for the WGCPA Reclaimed Water.

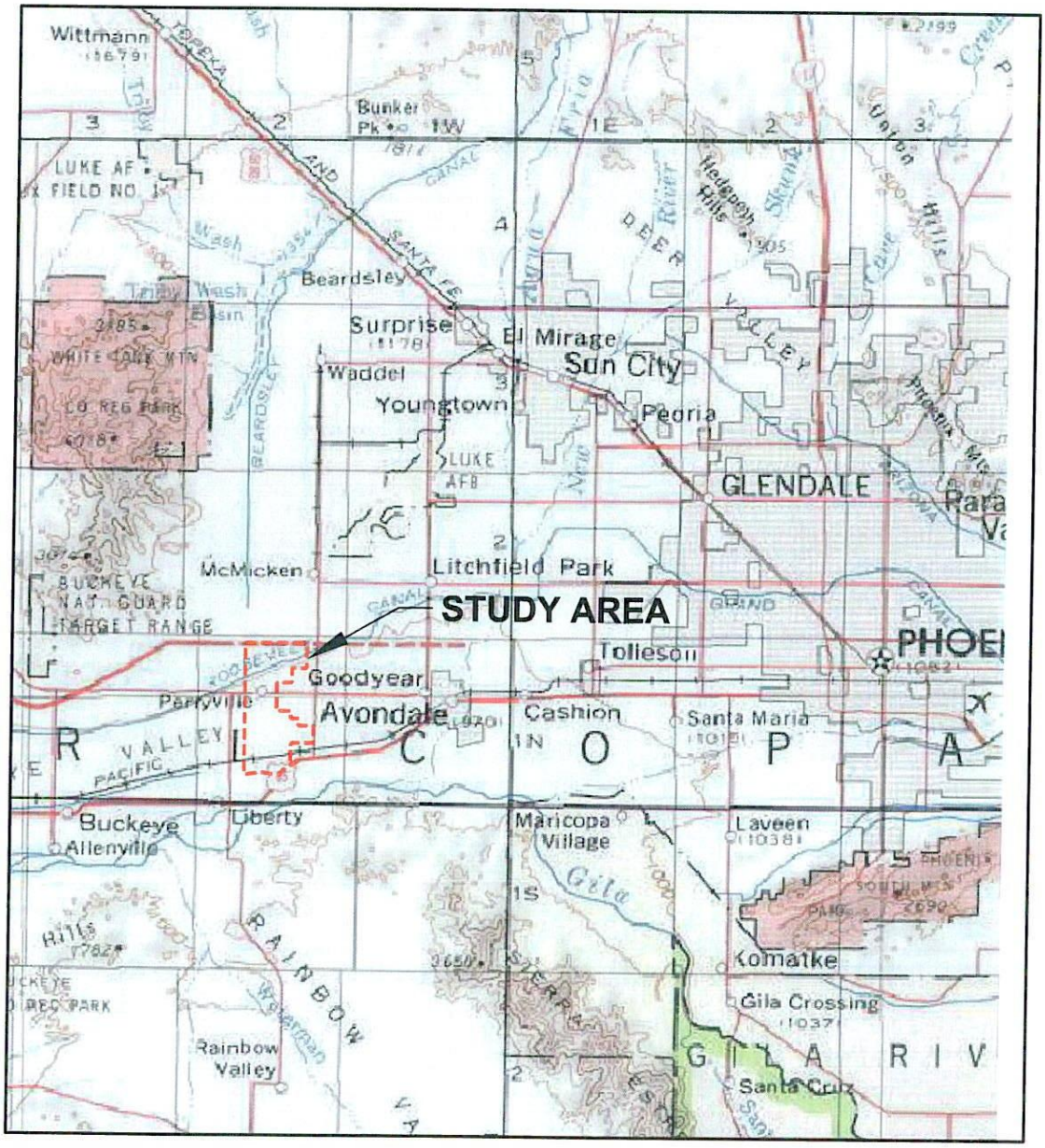
The reclaimed water system infrastructure needs of the WGCPA have been updated and are presented in this report. See Figure 1 for a project vicinity map.

1.2 Scope of Work

The five responding IDG Members retained CVL to complete an update the previously completed Water Master Plan which contained a discussion of the Reclaimed Water

Master Plan as discussed above. This study determines what system improvements and service capacities are necessary to provide service to WGCPA properties. This study has also recalculated the allocation of costs for these new facilities to the participating IDG properties as well as those

WEST GOODYEAR CENTRAL PLANNING AREA



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VICINITY MAP	MASTER RECLAIMED WATER STUDY	JOB NO 1.07.0112705
4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831	COE & VAN LOO PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE	FIGURE 1

other WGCPA properties not already served by existing reclaimed water facilities. The cost allocation for the new water facilities shall be based on an equivalent dwelling unit basis allocated over those WGCPA properties not currently served by existing City water facilities. The cost allocation for delivery lines shall be based on a gross area basis.

This report provides for the following tasks:

- Review most recent IWMP criteria.
- Reclaimed water demands for the WGCPA study area will be calculated using IWMP unit factors for each IDG parcel and currently unassigned areas.
- A reclaimed water delivery and distribution system necessary to serve the WGCPA will be developed with COG input and appropriately sized to meet the demand calculated above.
- A reclaimed water system model will be developed by CVL that will incorporate the development of the distribution system layouts, as approved by COG.
- Prepare a new report for COG review and approval to contain the following:
  - Introduction.
  - Reclaimed Water Analysis.
  - Distribution System Layout.
  - Connection to Existing Facilities.
  - Cost Analysis and Allocation to the service area properties identified in this report have been updated and reflect the latest findings of this report. See Section 6.0 for an in-depth discussion.
  - The report will include the necessary tables, figure and backup data/results.

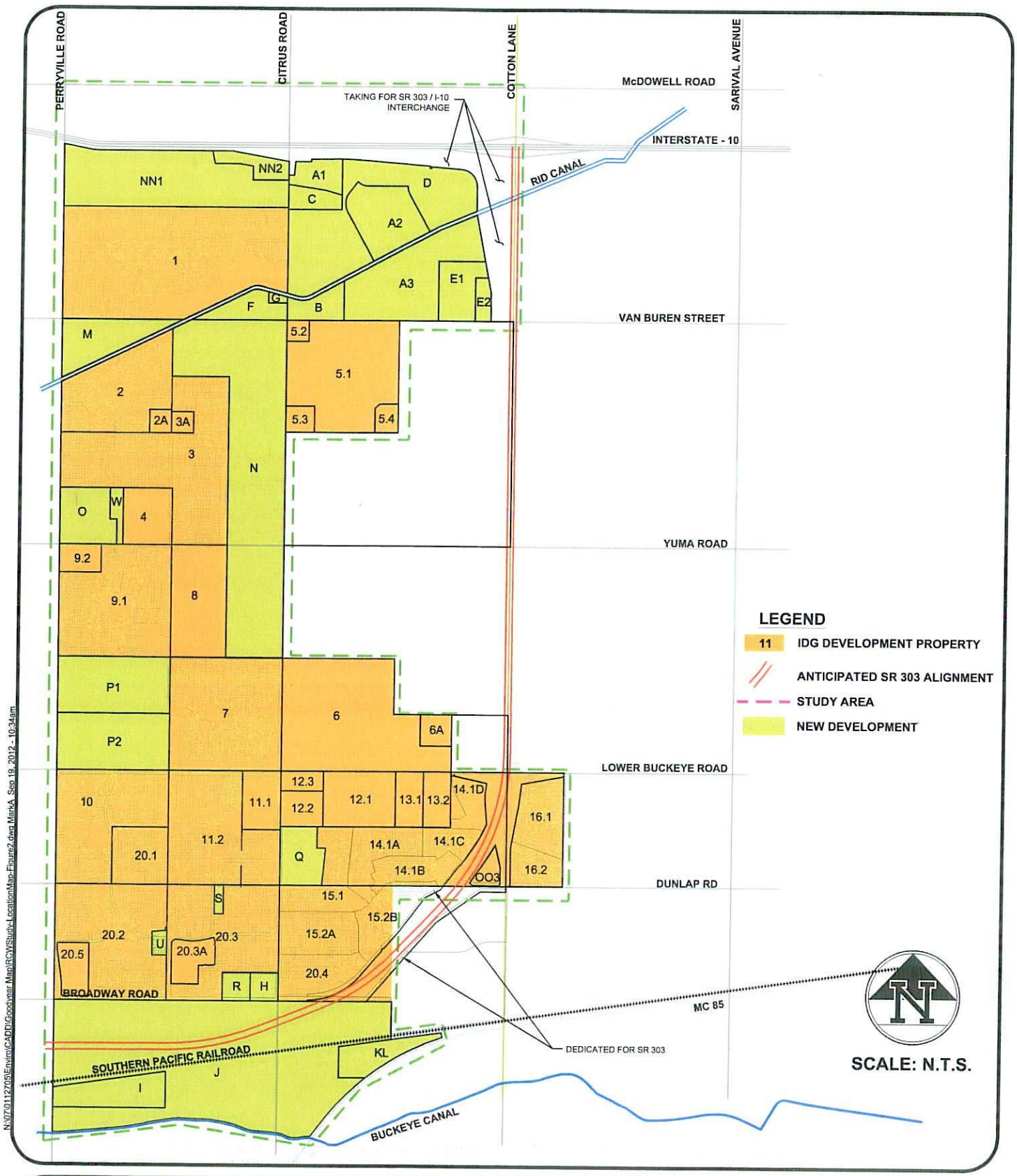
1.3 Location

The West Goodyear reclaimed water service area is approximately 3,500 acres and is bounded on the north by the Interstate-10 (I-10), on the east by Citrus/Cotton Lane, on the west by Perryville Road and on the south by the RID Canal (see Figure 2), and includes portions of sections 2, 3, 10, 11, 14, 15, 22, 23, 24, 26 and 27 of Township 1 North, Range 2 West of the Gila and Salt River base and Meridian, Maricopa County, Arizona. See Figure 2.

1.4 Land Use and Population

The City of Goodyear Land Use Plan for 2012 was used to generate the reclaimed water demands for the WGCPA (See Figure 2) for those areas of the study area not part of the IDG. Input from the COG Engineering and Planning Departments was obtained in several meetings held in January and February 2012 to clarify the intent of the Land Use Plan and obtain guidance in assigning a land use designation to County Islands located within the study area. The area consists mostly of single-family residential with industrial and commercial properties designated in the northern and southern portions of the study area. A breakdown of land use and dwelling unit densities is presented in

Figure 3 for IDG lands and additional development properties. Reclaimed water demands for the study area are based on dwelling units and acreage and not per capita use, therefore, no population projections are required.



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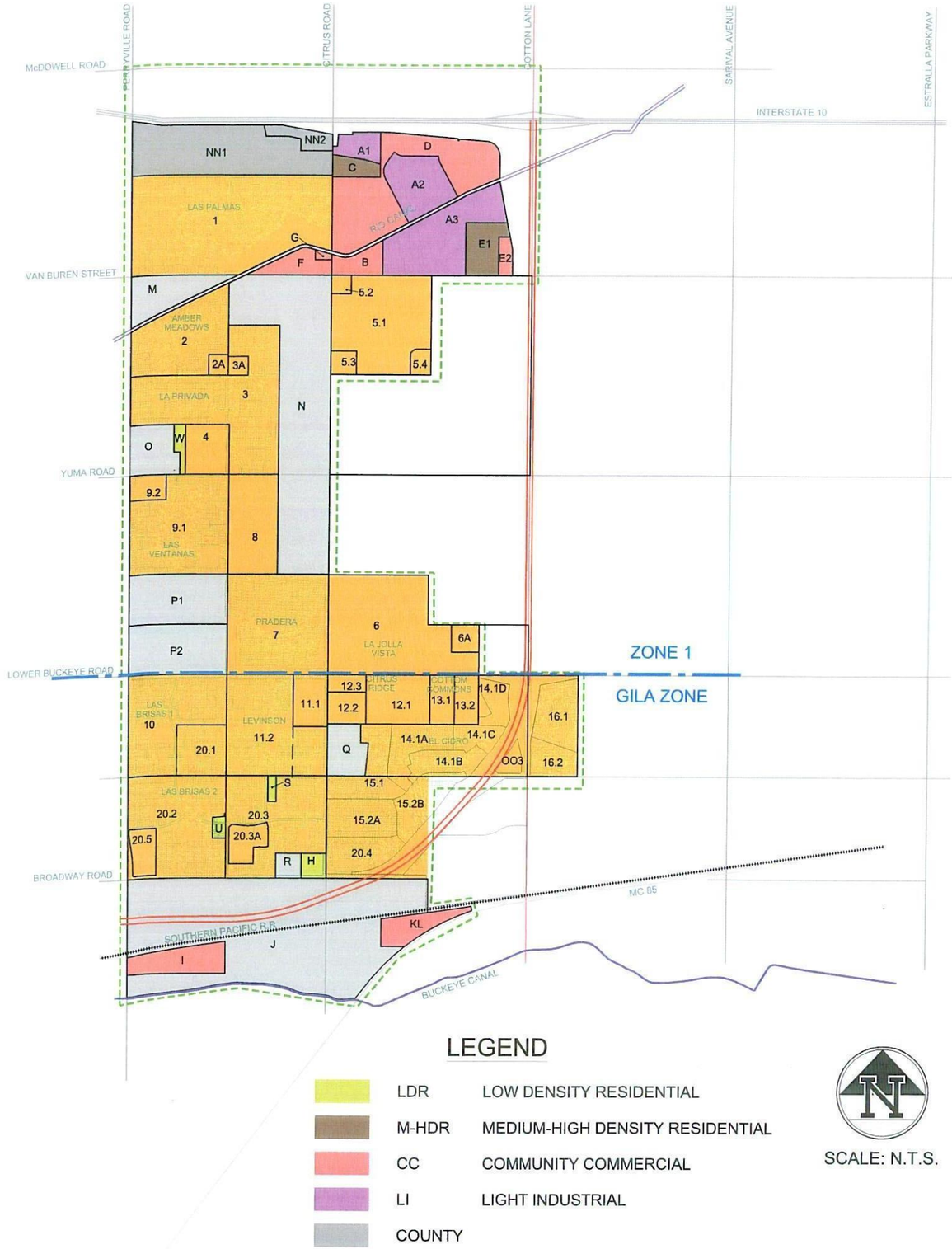
LOCATION MAP	MASTER RECLAIMED WATER STUDY	JOB NO 1.07.0112705
4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831	COE & VAN LOO PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE	FIGURE 2



LEGEND

	LDR	LOW DENSITY RESIDENTIAL
	M-HDR	MEDIUM-HIGH DENSITY RESIDENTIAL
	CC	COMMUNITY COMMERCIAL
	LI	LIGHT INDUSTRIAL
	COUNTY	

SCALE: N.T.S.

Area ID	IDG Development Group Properties	Land Use	Area	Service Area	Unit Flow	Average Flows		Maximum Flows (1.8 x Ave flow)	
			(acres)	(acres)	(gpad)	(gpd)	(gpm)	(gpd)	(gpm)
1	Las Palmas	Single Family	273	41	1,700	69,615	48	125,307	87
2	Amber Meadows	Single Family	102	15	1,700	26,010	18	46,818	33
2A	Amber Meadows School	School	6	3	4,500	13,500	9	24,300	17
3	La Privada	Single Family	194	29	1,700	49,470	34	89,046	62
3A	La Privada School	School	6	3	4,500	13,500	9	24,300	17
4	Paseo Ridge Phase II	Single Family	40	6	1,700	10,200	7	18,360	13
5.1	Silva-Rose Gardens	Single Family	135	20	1,700	34,425	24	61,965	43
5.2	Silva-Rose	Commercial Pad	7	1	1,700	1,190	1	2,142	1
5.3	Silva-Rose Gardens	City Water &Fire Campus	10	5	1,700	8,500	6	15,300	11
5.4	Silva-Rose Gardens	Charter School	8	4	4,500	18,000	13	32,400	23
6	La Jolla Vista	Single Family	188	28	1,700	47,940	33	86,292	60
6A	La Jolla Vista School	School	12	6	4,500	27,000	19	48,600	34
7	Pradera	Single Family	160	24	1,700	40,800	28	73,440	51
8	Paseo Ridge Phase I	Single Family	80	12	1,700	20,400	14	36,720	26
9.1	las Ventanas Single Family	Single Family	145	22	1,700	36,975	26	66,555	46
9.2	las Ventanas	Commercial Pad	15	2	1,700	2,550	2	4,590	3
10	Las Brisas Phs 1	Single Family	120	18	1,700	30,600	21	55,080	38
11.1	Levinson	Commercial Pad	27	3	1,700	4,590	3	8,262	6
11.2	Levinson	Single Family	133	20	1,700	33,915	24	61,047	42
12.1	Cotton Commons	Agua Fria HS District	50	25	4,500	112,500	78	202,500	141
12.2	Citrus Ridge (R1-6)	Single Family	19	3	1,700	4,771	3	8,588	6
12.3	Citrus Ridge (C2)	Commercial Pad	8	1	1,700	1,430	1	2,573	2
13.1	Cotton Commons (MHD)	Multi-Family	20	3	1,700	5,100	4	9,180	6
13.2	Cotton Commons (MD)	Multi-Family	20	3	1,700	5,100	4	9,180	6
14.1a	El Cidro Ranch	Single Family	38	6	1,700	9,659	7	17,387	12
14.1b	El Cidro Ranch	Single Family	28	4	1,700	7,035	5	12,664	9
14.1c	El Cidro Ranch	Single Family	18	3	1,700	4,672	3	8,409	6
14.1d	El Cidro Ranch	Single Family	18	3	1,700	4,687	3	8,436	6
15.1	El Cidro Ranch	Single Family	48	7	1,700	12,281	9	22,105	15
15.2a	El Cidro Ranch	Single Family	42	6	1,700	10,832	8	19,498	14
15.2b	El Cidro Ranch	Single Family	39	6	1,700	9,866	7	17,759	12
16.1	El Cidro Ranch	Single Family	42	6	1,700	10,817	8	19,471	14
16.2	El Cidro Ranch	Single Family	24	4	1,700	6,051	4	10,892	8
20.1	Las Brisas 2	Single Family	40	6	1,700	10,200	7	18,360	13
20.2	Las Brisas 2	Single Family	150	23	1,700	38,250	27	68,850	48
20.3	Las Brisas 2	Single Family	131	20	1,700	33,405	23	60,129	42
20.3A	Las Brisas 2 School	School	17	8	4,500	37,350	26	67,230	47
20.4	El Cidro Ranch	Single Family	38	6	1,700	9,616	7	17,309	12
20.5	Las Brisas Phase 2	Commercial Pad	19	2	1,700	3,264	2	5,875	4
Sub Total			2470	405		826,067	574	1,486,920	1,033

Area ID	Additional Development Properties	Land Use	Area	Service Area	Unit Flow	Average Flows		Maximum Flows (1.8 x Ave flow)	
			(acres)	(acres)	(gpad)	(gpd)	(gpm)	(gpd)	(gpm)
A1	-	Light Industrial	10	1.00	1,700	1,700	1	3,060	2
A2	-	Light Industrial	50	5.00	1,700	8,500	6	15,300	11
A3	-	Light Industrial	72	7.16	1,700	12,170	8	21,907	15
B	-	Community Commercial	20	2.00	1,700	3,400	2	6,120	4
C	-	M-HDR Multi-Family	10	1.50	1,700	2,550	2	4,590	3
D	-	Community Commercial	116	11.60	1,700	19,720	14	35,496	25
E1	-	M-HDR Multi-Family	20	3.00	1,700	5,100	4	9,180	6
E2	-	Community Commercial	5	0.50	1,700	850	1	1,530	1
F	-	Community Commercial	20	2.00	1,700	3,400	2	6,120	4
G	-	Community Commercial	2	0.20	1,700	340	0	612	0
H	-	LDR	10	1.50	1,700	2,550	2	4,590	3
I	-	Community Commercial	40	4.00	1,700	6,800	5	12,240	9
J	-	County Land-Light Industrial	370	37.00	1,700	62,900	44	113,220	79
K	-	Community Commercial	20	2.00	1,700	3,400	2	6,120	4
L	-	Community Commercial	7	0.70	1,700	1,190	1	2,142	1
M	-	County Land-RR	45	6.75	1,700	11,475	8	20,655	14
N	-	County Land-RR	250	37.50	1,700	63,750	44	114,750	80
NN1	-	County Land-CC	141	14.10	1,700	23,970	17	43,146	30
NN2	-	County Land-Light Industrial	13	1.28	1,700	2,168	2	3,902	3
O	-	County Land-LDR	30	4.50	1,700	7,650	5	13,770	10
OO3	-	Community Commercial	8	0.82	1,700	1,397	1	2,515	2
P1	-	County Land-LDR	75	11.25	1,700	19,125	13	34,425	24
P2	-	County Land-RR	75	11.25	1,700	19,125	13	34,425	24
Q	-	County Land-LDR	30	4.50	1,700	7,650	5	13,770	10
R	-	County Land-LDR	10	1.50	1,700	2,550	2	4,590	3
S	-	LDR	3	0.45	1,700	765	1	1,377	1
U	-	LDR	5	0.75	1,700	1,275	1	2,295	2
W	-	LDR	7	1.05	1,700	1,785	1	3,213	2
Sub Total			1,464	175		297,255	206	535,059	372
Grand Total of Service Area			3,934	580		1,123,322	780	**2,021,979**	1,404

WEST GOODYEAR
CENTRAL PLANNING AREA

RECLAIMED WATER STUDY AREA
LAND USE

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FIGURE
3

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1.5 Topographic Conditions

The existing natural topography of the WGCPA is relatively flat. The study area slopes from northwest to southeast. The high point within the service area property is in the northeast portion of the site at the intersection of Cotton Lane and the I-10, with an approximate elevation of 1,010 feet. The low point in the south portion of the site located at the intersection of Citrus Road and the Buckeye Canal, with an approximate elevation of 889 feet.

2.0 RECLAIMED WATER SYSTEM DESIGN CRITERIA

The design criteria used to estimate water demands for this project in this report are based on the 2008 IWMP supplemented by the *City of Goodyear Engineering Design Standards and Policy Manual* dated 2008 and City Staff; unless otherwise noted, all design criteria used in these calculations were obtained from these references. We note that the COG requires that all open spaces rights-of-way and park be irrigated with reclaimed water. Temporary connection to an alternate water system (potable or canal water, for example) shall be permitted on a case-by-case basis subject to the following minimum conditions:

- Development's proposed reclaimed water system is greater than 1 mile from an existing charged reclaimed water system.
- Only one point of connection is allowed to be equipped with a RPZ, painted purple.
- Provide the City with an in lieu payment for future abandonment and connection to the reclaimed water system.

2.1 Reclaimed Water Demand Criteria

The reclaimed water demand criteria used for the WGCPA are summarized in Table 1. Demand criteria were obtained from the City of Goodyear 2008 Integrated Master Plan and as discussed with COG Engineering staff.

Table 1 – Water Demand Criteria

Land Use	Average Day Demand Factor
Single-Family Residential	
Rural (0-2 DU/Ac)	1,700 gpd/Ac
Low Density (2-4 DU/Ac)	1,700 gpd/Ac
Low-Medium Density (4-6 DU/Ac)	1,700 gpd/Ac
Multi Family Residential	
Medium Density (6-10 DU/Ac)	1,700 gpd/Ac
Medium-High Density (10-20 DU/Ac)	1,700 gpd/Ac
Industrial/Commercial	
Light Industrial	1,700 gpd/Ac
Community Commercial	1,700 gpd/Ac
Schools, Parks	4,500 gpd/Ac

- Demands for commercial and industrial land uses will be calculated using the parcel's gross area multiplied by a factor of 0.10.
- Demands for parks and schools will be calculated using the parcel's gross area multiplied by a factor of 0.50.

- Demands for residential areas of all densities shall be calculated using the parcel's gross area multiplied by a factor of 0.15.

Additional design criteria for demand include:

- Maximum day peaking factor is 1.8 times the average day demand.

2.2 Reclaimed Water Delivery System Criteria

2.2.1 Reclaimed Water Delivery System

The reclaimed water distribution system will operate within minimum and maximum static pressure as designated by the City of Goodyear design standards. In accordance with the City of Goodyear design standards, the distribution system is to be sized to provide maximum day demand:

- Pressures
  - Pressures in the system shall be a minimum of 20 psi and not exceed 60 psi.
  - Where reclaimed water lines are located adjacent to potable water lines, the reclaimed water line pressures shall be designed to be 20 psi or more lower than the potable system pressures.
- Hazen-Williams coefficient of 130 will be used to model the water distribution system.
- Transmission Water Mains:
  - Review of the IWMP indicates that no transmission mains are planned within the GCPA.
- Distribution Water Mains
  - Pipe material shall be PVC C-900 purple pipe.
  - Minimum 8-inch diameter lines shall be the minimum size to be installed in any arterial street.
  - Minimum lines sizes in collector and local streets shall be 4-inch diameter.

The proposed water distribution system follows mostly arterial streets and is more inclusive than the IWMP reclaimed system.

2.3 Water Production and Storage System

The 157th Avenue WRF will serve as the source of reclaimed water for the WGCPA properties.

3.0 RECLAIMED WATER SYSTEM DEMANDS

The WGCPA average day, and maximum day reclaimed water demands were calculated in accordance with the demand criteria presented in Table 1 and Section 2.0 of this report.

3.1 Ultimate Reclaimed Water Demands

Table 2a presents the reclaimed water demands for the IDG properties. See Figure 3 for demand calculations.

Table 2a – Reclaimed Water Demands, IDG Properties

Area ID	Land Use	Area	Service Area	Unit Demand	Average Demand		Maximum Demand	
		(ac)	(ac)	(gpd/ac)	(gpd)	(gpm)	(gpd)	(gpm)
1	Las Palmas	273	41	1,700	69,615	48	125,307	87
2	Amber Meadows	102	15	1,700	26,010	18	46,818	33
2A	Amber Meadows School	6	3	4,500	13,500	9	24,300	17
3	La Privada	194	29	1,700	49,470	34	89,046	62
3A	La Privada School	6	3	4,500	13,500	9	24,300	17
4	Pasco Ridge Phase II	40	6	1,700	10,200	7	18,360	13
5	Silva – Rose Gardens	160	30	1,700	62,115	43	111,807	78
6	La Jolla Vista	188	28	1,700	47,940	33	86,292	60
6A	La Jolla Vista	12	6	4,500	27,000	19	48,600	34
7	Pradera	160	24	1,700	40,800	28	73,440	51
8	Pasco Ridge – Phase I	80	12	1,700	20,400	14	36,720	26
9	Las Ventanas	160	23	1,700	39,525	27	71,145	49
10	Las Brisas Phase I	120	18	1,700	30,600	21	55,080	38
11	Levison	160	23	1,700	38,505	27	69,309	48
12	Citrus Ridge	77	29	1,700	118,700	82	213,661	148
13	Cotton Commons	40	6	1,700	10,200	7	18,360	13
14	El Cidro Ranch	102	15	1,700	26,053	18	46,896	33
15	El Cidro Ranch	129	19	1,700	32,979	23	59,362	41
16	El Cidro Ranch	66	10	1,700	16,868	12	30,363	21
20	Las Brisas 2 / El Cidro Ranch	378	56	1,700	94,735	66	170,523	118
20.3A	Las Brisas 2 School	17	8	4,500	37,350	26	67,230	47
	TOTAL	**2470**	**405**		**826,065 826,067**	**574**	**1,486,919**	**1,033**

Table 2b presents the reclaimed water demands for the additional development properties as of 2012. See Figure 3 for demand calculations.

Table 2b – Reclaimed Water Demands, Other Properties

Area ID	Land Use	Area	Service Area	Unit Demand	Average Demand		Maximum Demand	
		(ac)	(ac)	(gpd/ac)	(gpd)	(gpm)	(gpd)	(gpm)
C	M-HDR Multi-Family[3]	10	2	1,700	2,550	2	4,590	3
E	M-HDR Multi-Family[3]	20	3	1,700	5,100	4	9,180	6
H	LDR Single Family[2]	10	2	1,700	2,550	2	4,590	3
M	County Land-RR[1]	45	7	1,700	11,475	8	20,655	14
N	County Land-RR[1]	250	38	1,700	63,750	44	114,750	80
O	County Land-LDR[2]	30	5	1,700	7,650	5	13,770	10
P	County Land- LDR[2]	75	11	1,700	19,125	13	34,425	24
	County Land-RR[1]	75	11	1,700	19,125	13	34,425	24
Q	County Land-LDR[2]	30	5	1,700	7,650	5	13,770	10
R	County Land-LDR[2]	10	2	1,700	2,550	2	4,590	3
S	LDR[2]	3	0	1,700	765	1	1,377	1
U	LDR[2]	5	1	1,700	1,275	1	2,295	2
W	LDR[2]	7	1	1,700	1,785	1	3,213	2
	Subtotal Residential	**570**	**86**		**145,350**	**101**	**261,630**	**182**
A1	Light Industrial	10	1	1,700	1,700	1	3,060	2
A2	Light Industrial	50	5	1,700	8,500	6	15,300	11
A3	Light Industrial	72	7	1,700	12,170	8	21,907	15
B	Community Commercial	20	2	1,700	3,400	2	6,120	4
D	Community Commercial	116	12	1,700	19,720	14	35,496	25
E2	Community Commercial	5	1	1,700	850	1	1,530	1
F	Community Commercial	20	2	1,700	3,400	2	6,120	4
G	Community Commercial	2	0	1,700	340	0	612	0
I	Community Commercial	40	4	1,700	6,800	5	12,240	9
J	County Land-Light Industrial	370	37	1,700	62,900	44	113,220	79
K	Community Commercial	20	2	1,700	3,400	2	6,120	4
L	Community Commercial	7	1	1,700	1,190	1	2,142	1
NN1	County Land-CC	141	14	1,700	23,970	17	43,146	30
NN2	County Land-Light Industrial	13	1	1,700	2,168	2	3,902	3

Area ID	Land Use	Area	Service Area	Unit Demand	Average Demand		Maximum Demand	
OO3	Community Commercial	8	1	1,700	1,397	1	2,515	2
	Subtotal Industrial/Commercial	**894**	**89**		**151,905**	**105**	**273,429**	**190**
	TOTAL	**1,464**	**175**		**297,255**	**206**	**535,059**	**372**

1RR Rural Residential (0-2 du/ac)
2LDR- Low Density Residential (2-4 du/ac)
3M-HDR Medium-High Density Residential (10-20 du/ac)

Table 2c shows the total reclaimed water demands as shown in Tables 2a and 2b.

Table 2c – Summary Reclaimed Water Demands

Table	Land Use	Area	Service Area	Average Demand		Maximum Demand	
		(ac)	(ac)	(gpd)	(gpm)	(gpd)	(gpm)
2a	All	2,470	405	826,067	574	1,486920	1,033
2b	All	1,464	175	297,255	206	535,059	372
	TOTAL	**3,934**	**580**	**1,123,322**	**780**	**2,021,979**	**1,405**

Table 3 shows reclaimed water demands by pressure zones as defined in the 2008 IWMP.

Table 3 – Ultimate Reclaimed Water Demands by Zone

Zone	Average Day Demand (gpm)	Max Day Demand (gpm)
Zone 1	435	784
Gila River Zone	345	621
TOTAL	**780**	**1,405**

4.0 EXISTING INFRASTRUCTURE

4.1 Water Service Area

Most, but not all, of the WGCPA study area is within the COG water service area. Figure 4 indicates that the area west and north of Van Buren and Citrus is within the Arizona Water Company service area. A small area in Section 14, T1N, R2W is in the Valencia Water District. Following conversations with ADWR, it was determined that reclaimed water generated from a private water service provider becomes the property of the City of Goodyear when collected as wastewater and treated at the 157th Avenue WRF.

4.2 Existing Distribution System

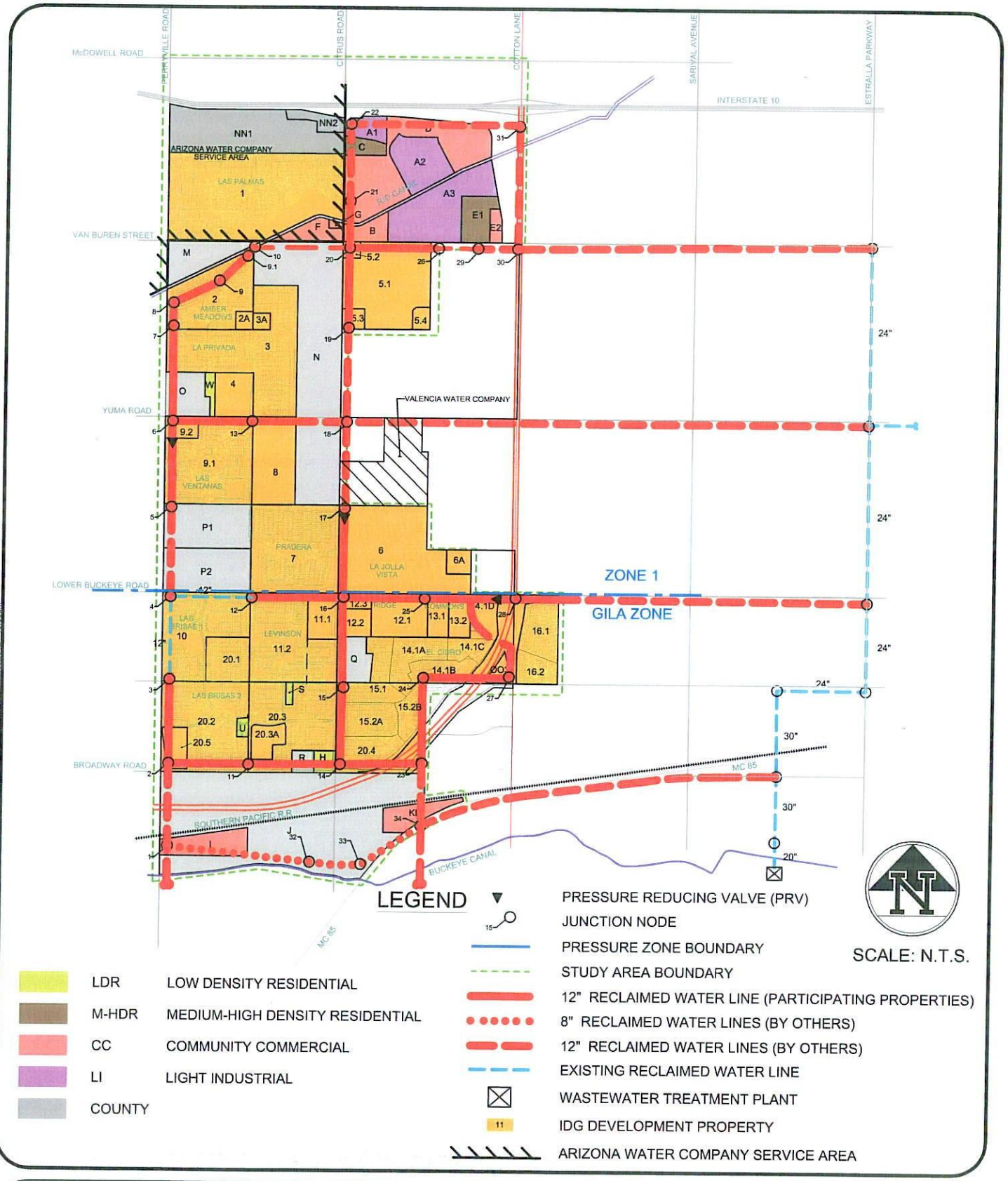
The existing reclaimed water system has very few installations in the project area. The existing installations in Lower Buckeye Road and Perryville Road are shown on Figure 4. A more extensive distribution system exists from the 157th Ave WWTP. None of these existing 24-inch lines reach the project area.

4.3 Existing Production and Storage Systems

A reclaimed water pumping station is located at the 157th Avenue WWTP.

4.4 Interim Solutions

For interim conditions reclaimed water needs will be met with potable water through the potable water system. Potable water lines will not need to be sized to convey additional irrigation flows to compensate for an incomplete reclaimed water system. It is assumed that the potable water system has additional capacity sufficient to convey irrigation flows until full build out, at which time the reclaimed water system will also be built out and providing the necessary conveyance capacity.



LEGEND

LDR	LOW DENSITY RESIDENTIAL
M-HDR	MEDIUM-HIGH DENSITY RESIDENTIAL
CC	COMMUNITY COMMERCIAL
LI	LIGHT INDUSTRIAL
	COUNTY

- PRESSURE REDUCING VALVE (PRV)
- JUNCTION NODE
- PRESSURE ZONE BOUNDARY
- STUDY AREA BOUNDARY
- 12" RECLAIMED WATER LINE (PARTICIPATING PROPERTIES)
- 8" RECLAIMED WATER LINES (BY OTHERS)
- 12" RECLAIMED WATER LINES (BY OTHERS)
- EXISTING RECLAIMED WATER LINE
- WASTEWATER TREATMENT PLANT
- IDG DEVELOPMENT PROPERTY
- ARIZONA WATER COMPANY SERVICE AREA

SCALE: N.T.S.

N:\07\0112705\EnviroCADD\Goodyear Map\Reclaimed Water\EXIST & PROP RCW SYSTEM - FIGURE 4.dwg MarkA Sep 19, 2012 - 10:38am

WEST GOODYEAR CENTRAL PLANNING AREA	**EXISTING & PROPOSED RECLAIMED SYSTEM MAINS AND ZONES**	JOB NO 1.07.0112705
4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831	**COE & VAN LOO** PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE	FIGURE 4

5.0 RECLAIMED WATER SYSTEM MODELING

The existing and proposed reclaimed water system mains were modeled using WaterCAD software. The model was developed considering the projected demands. The source of the reclaimed water for this area is the 157th Avenue Wastewater Treatment Facility. The system was modeled using mostly 12-inch pipes and some 8-inch pipes in outer locations. Some of the pipes will be installed by property owners other than IDG. These pipes are projected to be 12-inch in diameter and connecting pipes should not have a smaller diameter.

The Integrated Master Plan assumes this area will be divided into two different pressure zones similar to the potable water system (see Figure 4). Pressure reducing stations were not modeled initially but were modeled when pressure ranges exceeded the design pressure range listed in Section 2.2.1. Pressure reducing valves will likely have to be installed in the reclaimed water system to achieve the desired pressure range of 20 to 60 psi at all locations. In the model pressure reducing stations were installed at the following locations:

- Intersection of Cotton Lane and Lower Buckeye Road
- Intersection of Citrus Road and West Durango Street
- South of the intersection of Peryville Road and Yuma Road

Figure 4 shows the reclaimed water system model. The modeling results may be found in Appendix A but the results are summarized in Table 4.

Table 4 – Results of Water CAD Analysis for Buildout

	Demand	Pressure (psig)				Maximum	Pipe
Scenario	(gpm)	Minimum	Node	Maximum	Node	Velocity (fps)	ID
Average Day	780	26.7	J-5	60.2	J-13	0.84	P-69
Maximum Day	1,405	25.9	J-5	58.8	J-13	1.39	P-69

The results indicate that the proposed water distribution system infrastructure will deliver reclaimed water at acceptable flows and pressures to the WGCPA properties.

6.0 COST ANALYSIS

CVL has calculated costs for the implementation of the Ultimate reclaimed water system improvements described in this report. Costs were obtained from actual bidding results for elements of the work installed, available bid data from similar projects designed by CVL, budgetary quotes from material and equipment vendors, and recent estimates for projects in the Phoenix area. We note that the estimates shown below are subject to change owing to local, national and international pressures on materials, energy and services.

6.1 Ultimate System

The reclaimed water facilities included in this estimate are shown in Figure 4 and are listed below:

- Reclaimed Water Transmission Lines to be placed in arterial streets.
- Three Pressure Reducing Stations.

The costs of on-site delivery/distribution mains for reclaimed water shall be borne by each WGCPA Property as those properties are developed and are not included in the estimate. See Table 5 for an estimate of costs for the construction of reclaimed water mains within the arterial streets fronting each IDG participant's parcel. As noted above, each parcel will be responsible for the cost of installation of these reclaimed water lines. Shared road frontages will result in a proportional cost sharing of each reach of main.

Table 5 – Reclaimed Water Distribution System Cost

IDG Property	Reach	Length (ft)	Diameter (in)	Participation	Cost
1	Citrus Road	1,320	12	1	$ 79,200.00
2	RID Canal	4,123	12	1	$ 247,380.00
3	Peryville Road	2,640	12	1	$ 158,400.00
3	Yuma Road	1,320	12	½	$ 39,600.00
4	Yuma Road	2,640	12	¼	$ 39,600.00
5	Citrus Road	2,640	12	1	$ 158,400.00
5	Van Buren Street	2,640	12	1	$ 158,400.00
6	Citrus Road	2,640	12	½	$ 79,200.00
6	Lower Buckeye Road	2,640	12	½	$ 79,200.00
6	Lower Buckeye Road	2,640	12	¼	$ 39,600.00
7	Citrus Road	2,640	12	½	$ 79,200.00
7	Lower Buckeye Road	2,640	12	½	$ 79,200.00
8	Yuma Road	1,320	12	½	$ 39,600.00

IDG Property	Reach	Length (ft)	Diameter (in)	Participation	Cost
9	Yuma Road	2,640	12	¾	$ 118,800.00
9	Peryville Road	2,640	12	1	$ 158,400.00
11	Lower Buckeye Road	2,640	12	½	$ 79,200.00
11	Citrus Road	2,640	12	¾	$ 118,800.00
12	Lower Buckeye Road	2,640	12	½	$ 79,200.00
12	Citrus Road	2,640	12	¼	$ 39,600.00
13	Lower Buckeye Road	2,640	12	¼	$ 39,600.00
13	Pioneer Street to Lower Buckeye Road	3,960	12	1/6	$ 39,600.00
14	Lower Buckeye Road	2,640	12	½	$ 79,200.00
14	Pioneer Street to Lower Buckeye Road	3,960	12	½	$ 118,800.00
14	West Pioneer Street	2,640	12	1	$ 158,400.00
15	Citrus Road	2,640	12	¼	$ 39,600.00
16	Pioneer Street to Lower Buckeye Road	3,960	12	1/3	$ 79,200.00
16	Lower Buckeye Road	1,320	12	1	$ 79,200.00
20	Citrus Road	2,640	12	¾	$ 118,800.00
20	175th Avenue	2,640	12	1	$ 158,400.00
20	Peryville Road	2,640	12	1	$ 158,400.00
20	Broadway Road	7,920	12	1	$ 475,200.00

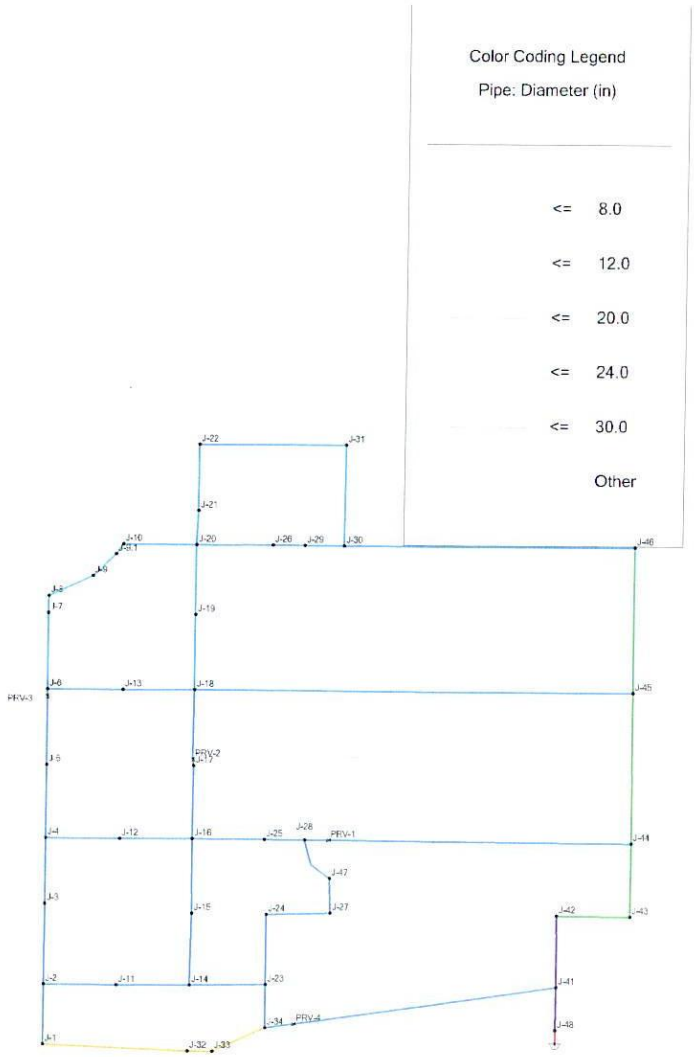
7.0 REFERENCES

1. Integrated Water Master Plan for City of Goodyear, Black & Veatch, June 2008.

APPENDIX A

WCAD RESULTS
RECLAIMED WATER SYSTEM

Scenario: Maximum Flows



Appendix A, Figure 4

Average Flows
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	896.00	100.72	1,021.59	54.3
J-2	909.00	17.64	1,021.62	48.7
J-3	926	20.81	1,021.63	41.4
J-4	940	13.72	1,021.64	35.3
J-5	960	19.7	1,021.64	26.7
J-6	978.00	14.74	1,112.21	58.1
J-7	994	13.74	1,112.21	51.1
J-8	1,000.50	6.02	1,112.21	48.3
J-9	989.4	24.77	1,112.21	53.1
J-9.1	1,004.00	19.22	1,112.21	46.8
J-10	1,005.00	32.14	1,112.21	46.4
J-11	912	60.44	1,021.66	47.4
J-12	942.00	39.67	1,021.69	34.5
J-13	973.00	47.83	1,112.23	60.2
J-14	901.00	23.14	1,021.80	52.3
J-15	927	37.75	1,021.80	41
J-16	937	27.89	1,021.80	36.7
J-17	959	20.07	1,021.80	27.2
J-18	974	12.65	1,112.30	59.8
J-19	988	24.53	1,112.27	53.8
J-20	1,000.00	18.09	1,112.27	48.6
J-21	1,009.00	31.02	1,112.27	44.7
J-22	1,028.00	27.01	1,112.28	36.5
J-23	908	3.34	1,022.05	49.3
J-24	926.00	21.69	1,022.14	41.6
J-25	948.00	117.28	1,022.07	32
J-26	994.00	32.9	1,112.31	51.2
J-27	925.00	12.68	1,022.27	42.1
J-28	942	3.25	1,022.46	34.8
J-29	994.00	4.13	1,112.35	51.2
J-30	989	0	1,112.41	53.4
J-31	1,010.00	6.85	1,112.35	44.3
J-32	889	8.74	1,021.83	57.5
J-33	896	8.74	1,021.88	54.5
J-34	902	99.19	1,022.07	51.9
J-41	915	0	1,113.80	86
J-42	937.00	0	1,113.75	76.5
J-43	935	0	1,113.62	77.3
J-44	951	0	1,113.48	70.3
J-45	971	0	1,113.43	61.6
J-46	991.00	0	1,113.41	53
J-47	932	0	1,022.35	39.1
J-48	910.00	0	1,113.84	88.2

Average Flows
Steady State Analysis
Pipe Report

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)
P-2	2,576.96	J-41	J-42	30	Ductile Iron	130	0.34
P-3	2,643.48	J-42	J-43	24	Ductile Iron	130	0.53
P-4	2,632.48	J-43	J-44	24	Ductile Iron	130	0.53
P-5	5,419.52	J-44	J-45	24	Ductile Iron	130	0.22
P-6	5,250.38	J-45	J-46	24	Ductile Iron	130	0.12
P-11	2,532.76	J-24	J-23	12	PVC	130	0.29
P-12	1,556.26	J-23	J-34	12	PVC	130	0.18
P-13	2,089.37	J-34	J-33	8	PVC	130	0.36
P-14	864.59	J-33	J-32	8	PVC	130	0.3
P-15	5,230.92	J-32	J-1	8	PVC	130	0.25
P-16	2,161.47	J-1	J-2	12	PVC	130	0.18
P-17	2,630.25	J-2	J-11	12	PVC	130	0.18
P-18	2,632.96	J-11	J-14	12	PVC	130	0.35
P-19	2,727.85	J-14	J-23	12	PVC	130	0.47
P-20	2,594.19	J-14	J-15	12	PVC	130	0.05
P-21	2,683.09	J-15	J-16	12	PVC	130	0.06
P-22	2,621.25	J-16	J-12	12	PVC	130	0.31
P-23	2,662.03	J-12	J-4	12	Ductile Iron	130	0.2
P-24	2,362.14	J-4	J-3	12	Ductile Iron	130	0.11
P-25	2,917.32	J-3	J-2	12	PVC	130	0.05
P-26	2,583.49	J-16	J-25	12	PVC	130	0.51
P-40	2,634.22	J-17	J-16	12	PVC	130	0.06
P-41	2,584.89	J-18	J-13	12	PVC	130	0.24
P-42	2,707.22	J-13	J-6	12	PVC	130	0.11
P-52	2,744.42	J-26	J-20	12	PVC	130	0.19
P-53	2,510.38	J-20	J-19	12	PVC	130	0.07
P-54	2,717.44	J-19	J-18	12	PVC	130	0.14
P-55	2,629.90	J-20	J-10	12	PVC	130	0.21
P-56	441.09	J-10	J-9.1	12	PVC	130	0.12
P-57	1,132.00	J-9.1	J-9	12	PVC	130	0.06
P-58	1,748.79	J-9	J-8	12	PVC	130	0.01
P-59	615.82	J-8	J-7	12	PVC	130	0.02
P-60	2,765.52	J-7	J-6	12	PVC	130	0.06
P-61	1,238.10	J-20	J-21	12	PVC	130	0
P-63	3,641.81	J-31	J-30	12	PVC	130	0.19
P-50	1,417.17	J-30	J-29	12	PVC	130	0.3
P-66	1,145.38	J-29	J-26	12	PVC	130	0.28
P-69	1,450.75	J-25	J-28	12	PVC	130	0.84
P-72	2,282.79	J-27	J-24	12	PVC	130	0.35
P-79	1,746.25	J-28	J-47	12	PVC	130	0.39
P-80	1,239.47	J-47	J-27	12	Ductile Iron	130	0.39
P-81	553.24	R-1	J-48	20	Ductile Iron	130	0.99
P-82	1,557.90	J-48	J-41	30	PVC	130	0.44
P-83	15,821.63	J-45	J-18	12	PVC	130	0.41
P-85	2,391.76	J-21	J-22	12	PVC	130	0.09
P-86	5,275.76	J-22	J-31	12	PVC	130	0.17
P-87	10,939.88	J-44	PRV-1	12	PVC	130	1.24
P-88	856.21	PRV-1	J-28	12	PVC	130	1.24
P-93	2,500.96	J-18	PRV-2	12	PVC	130	0
P-94	236.90	PRV-2	J-17	12	PVC	130	0
P-98	2,638.75	J-5	J-4	12	PVC	130	0.06
P-100	262.94	J-6	PRV-3	12	PVC	130	0
P-101	2,453.29	PRV-3	J-5	12	PVC	130	0
P-102	10,510.09	J-46	J-30	12	PVC	130	0.48

Maximum Flows
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	896	184.5	1,019.72	53.5
J-2	909	31.76	1,019.80	47.9
J-3	926.00	37.45	1,019.81	40.6
J-4	940	24.7	1,019.84	34.5
J-5	960	35.46	1,019.83	25.9
J-6	978	26.54	1,108.92	56.6
J-7	994	24.74	1,108.91	49.7
J-8	1,000.50	10.84	1,108.91	46.9
J-9	989.40	44.59	1,108.91	51.7
J-9.1	1,004.00	34.59	1,108.91	45.4
J-10	1,005.00	57.85	1,108.92	45
J-11	912	108.79	1,019.92	46.7
J-12	942	71.4	1,019.97	33.7
J-13	973.00	86.09	1,108.97	58.8
J-14	901	41.65	1,020.33	51.6
J-15	927.00	67.94	1,020.28	40.4
J-16	937	50.21	1,020.28	36
J-17	959.00	36.13	1,020.27	26.5
J-18	974.00	22.77	1,109.17	58.5
J-19	988	44.15	1,109.10	52.4
J-20	1,000.00	32.55	1,109.08	47.2
J-21	1,009.00	55.83	1,109.08	43.3
J-22	1,028.00	48.61	1,109.11	35.1
J-23	908	6.01	1,021.23	49
J-24	926	39.04	1,021.36	41.3
J-25	948	211.1	1,020.90	31.5
J-26	994	59.23	1,109.22	49.8
J-27	925	22.83	1,021.55	41.8
J-28	942	5.86	1,021.87	34.6
J-29	994	7.44	1,109.34	49.9
J-30	989	0	1,109.50	52.1
J-31	1,010.00	12.33	1,109.32	43
J-32	889	15.73	1,020.60	56.9
J-33	896	15.73	1,020.81	54
J-34	902	181.74	1,021.46	51.7
J-41	915	0	1,113.49	85.9
J-42	937.00	0	1,113.38	76.3
J-43	935.00	0	1,113.03	77
J-44	951.00	0	1,112.69	70
J-45	971.00	0	1,112.53	61.2
J-46	991.00	0	1,112.48	52.6
J-47	932.00	0	1,021.68	38.8
J-48	910.00	0	1,113.62	88.1

Maximum Flows
Steady State Analysis
Pipe Report

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Velocity (ft/s)
P-2	2,576.96	J-41	J-42	30	Ductile Iron	130	0.57
P-3	2,643.48	J-42	J-43	24	Ductile Iron	130	0.88
P-4	2,632.48	J-43	J-44	24	Ductile Iron	130	0.88
P-5	5,419.52	J-44	J-45	24	Ductile Iron	130	0.4
P-6	5,250.38	J-45	J-46	24	Ductile Iron	130	0.22
P-11	2,532.76	J-24	J-23	12	PVC	130	0.34
P-12	1,556.26	J-23	J-34	12	PVC	130	0.62
P-13	2,089.37	J-34	J-33	8	PVC	130	0.71
P-14	864.59	J-33	J-32	8	PVC	130	0.61
P-15	5,230.92	J-32	J-1	8	PVC	130	0.51
P-16	2,161.47	J-1	J-2	12	PVC	130	0.3
P-17	2,630.25	J-2	J-11	12	PVC	130	0.32
P-18	2,632.96	J-11	J-14	12	PVC	130	0.63
P-19	2,727.85	J-14	J-23	12	PVC	130	0.94
P-20	2,594.19	J-14	J-15	12	PVC	130	0.19
P-21	2,683.09	J-15	J-16	12	PVC	130	0
P-22	2,621.25	J-16	J-12	12	PVC	130	0.54
P-23	2,662.03	J-12	J-4	12	Ductile Iron	130	0.34
P-24	2,362.14	J-4	J-3	12	Ductile Iron	130	0.17
P-25	2,917.32	J-3	J-2	12	PVC	130	0.06
P-26	2,583.49	J-16	J-25	12	PVC	130	0.79
P-40	2,634.22	J-17	J-16	12	PVC	130	0.1
P-41	2,584.89	J-18	J-13	12	PVC	130	0.43
P-42	2,707.22	J-13	J-6	12	PVC	130	0.19
P-52	2,744.42	J-26	J-20	12	PVC	130	0.34
P-53	2,510.38	J-20	J-19	12	PVC	130	0.12
P-54	2,717.44	J-19	J-18	12	PVC	130	0.25
P-55	2,629.90	J-20	J-10	12	PVC	130	0.38
P-56	441.09	J-10	J-9.1	12	PVC	130	0.21
P-57	1,132.00	J-9.1	J-9	12	PVC	130	0.11
P-58	1,748.79	J-9	J-8	12	PVC	130	0.01
P-59	615.82	J-8	J-7	12	PVC	130	0.04
P-60	2,765.52	J-7	J-6	12	PVC	130	0.11
P-61	1,238.10	J-20	J-21	12	PVC	130	0.01
P-63	3,641.81	J-31	J-30	12	PVC	130	0.34
P-50	1,417.17	J-30	J-29	12	PVC	130	0.53
P-66	1,145.38	J-29	J-26	12	PVC	130	0.51
P-69	1,450.75	J-25	J-28	12	PVC	130	1.39
P-72	2,282.79	J-27	J-24	12	PVC	130	0.45
P-79	1,746.25	J-28	J-47	12	PVC	130	0.52
P-80	1,239.47	J-47	J-27	12	Ductile Iron	130	0.52
P-81	553.24	R-1	J-48	20	Ductile Iron	130	1.79
P-82	1,557.90	J-48	J-41	30	PVC	130	0.8
P-83	15,821.63	J-45	J-18	12	PVC	130	0.74
P-85	2,391.76	J-21	J-22	12	PVC	130	0.16
P-86	5,275.76	J-22	J-31	12	PVC	130	0.3
P-87	10,939.88	J-44	PRV-1	12	PVC	130	1.92
P-88	856.21	PRV-1	J-28	12	PVC	130	1.92
P-93	2,500.96	J-18	PRV-2	12	PVC	130	0
P-94	236.90	PRV-2	J-17	12	PVC	130	0
P-98	2,638.75	J-5	J-4	12	PVC	130	0.1
P-100	262.94	J-6	PRV-3	12	PVC	130	0
P-101	2,453.29	PRV-3	J-5	12	PVC	130	0
P-102	10,510.09	J-46	J-30	12	PVC	130	0.87

Average Flows
Steady State Analysis
Pressure Reducing Valves Report

ID	Label	Elevation (ft)	Diameter (Valve)	Hydraulic Grade Setting (Initial)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From)	Hydraulic Grade (To)	Headloss (ft)
218	PRV-1	942	12	1022.87	35	436.6	1107.51	1022.93	84.58
227	PRV-2	959	12	982.1	10	0	1112.3	1021.8	0
238	PRV-3	978	12	1012.66	15	0	1112.21	1021.64	0
247	PRV-4	902	12	1022.15	52	219.86	1112.33	1022.23	90.1

Maximum Flows
Steady State Analysis
Pressure Reducing Valves Report

ID	Label	Elevation (ft)	Diameter (Valve)	Hydraulic Grade Setting (Initial)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From)	Hydraulic Grade (To)	Headloss (ft)
218	PRV-1	942	12	1022.87	35	676.94	1099.23	1022.93	76.3
227	PRV-2	959	12	982.1	10	0	1109.17	1020.27	0
238	PRV-3	978	12	1012.66	15	0	1108.92	1019.83	0